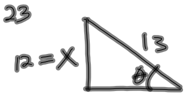
23



$\frac{d\theta}{dt} = 2 \quad \frac{dx}{dt} = ?$

$\sqrt{13^2 - 12^2} = 5 \quad \sin\theta = \frac{x}{13}$

$x = 13\sin\theta$

$\frac{dx}{dt} = 13\cos\theta \frac{d\theta}{dt}$

$= 13\cos\theta \cdot 2$

$= 13 \cdot \frac{5}{13} \cdot 2 = 10$

Feb 19-9:00 AM

25.

$\lim_{k\to\infty} \sum_{j=1}^{k} \frac{1}{\sqrt{x_j}} \Delta x$

$\int_w^v \frac{1}{\sqrt{x}}\, dx$

$\int_a^b f(x)\, dx = \lim_{n\to\infty} \sum_{i=1}^{n} f(x_i)\Delta x$

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24. $\left(1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} = \cos(x)\right.$

$h'(x) = \cos(x)^3 \qquad x^7$

$h(x) = \int \cos(x)^3$

$\left(1 - \frac{(x^3)^2}{2!} + \frac{(x^3)^4}{4!} \ldots\right) = \cos(x^3)$

$1 - \frac{x^6}{2!} + \frac{x^{12}}{4!} = \cos x^3$

$\int 1 - \frac{x^6}{2!} + \frac{x^{12}}{4!}$

$x - \frac{x^7}{2! \cdot 7} + \qquad -\frac{1}{14}$

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15. $x = 2\sin t \quad y = 3\cos t \quad 0 \le t \le \frac{\pi}{2}$

$\int_0^{\frac{\pi}{2}} \sqrt{(2\cos t)^2 + (-3\sin t)^2}\, dt$

$\int_0^{\frac{\pi}{2}} \sqrt{4\cos^2 t + 9\sin^2 t}\, dt$

$\int_0^{\frac{\pi}{2}} \sqrt{\underline{4\cos^2 t + 4\sin^2 t} + 5\sin^2 t}\, dt$

Feb 19-9:35 AM

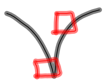
Review 3 Differentiable Functions

$f(x)$ is differentiable means: $f'(x)$ exists

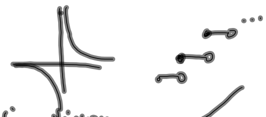
not differentiable

locally linear

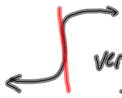
corner



cusp

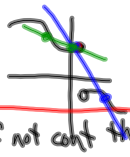


discontinuous



vertical tangent

If f is diff then it is cont.



If f not cont then not diff

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number = slope of tan

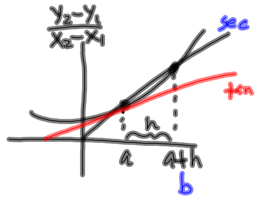
$$f'(a) = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

same

number

$$f'(a) = \lim_{b\to a} \frac{f(b)-f(a)}{b-a}$$

$$\frac{y_2-y_1}{x_2-x_1}$$



expression

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

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$$\lim_{h\to 0} \frac{\ln(2+h)-\ln(2)}{h} = \frac{1}{2}$$

$f(x) = \ln x$

$f'(2) = \frac{1}{2}$

Feb 19-10:02 AM

$$f(x) = \begin{cases} 3-x, & x<1 \\ ax^2+bx, & x\geq 1 \end{cases}$$

a) Find the relation between a & b so $f(x)$ is continuous at $x=1$

b) Find values for a & b so that $f(x)$ is differentiable at $x=1$.

a) $3-1 = a+b$ $\quad a+b=2$

lhl = rhl

b) $2ax+b=-1$

$$\begin{array}{r} 2a+b=-1 \\ -(a+b=2) \\ \hline a=-3 \quad b=5 \end{array}$$

Feb 19-10:06 AM